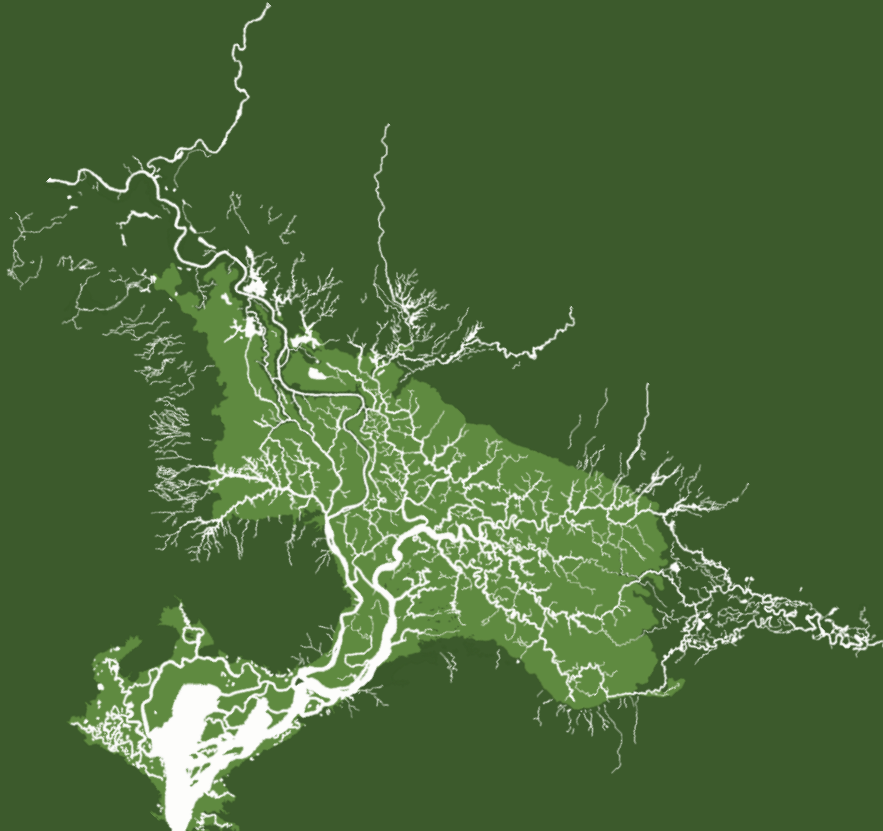


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# Delta Stewardship Council

## Process-based Restoration 23 Aug 2018



Agenda Item 7

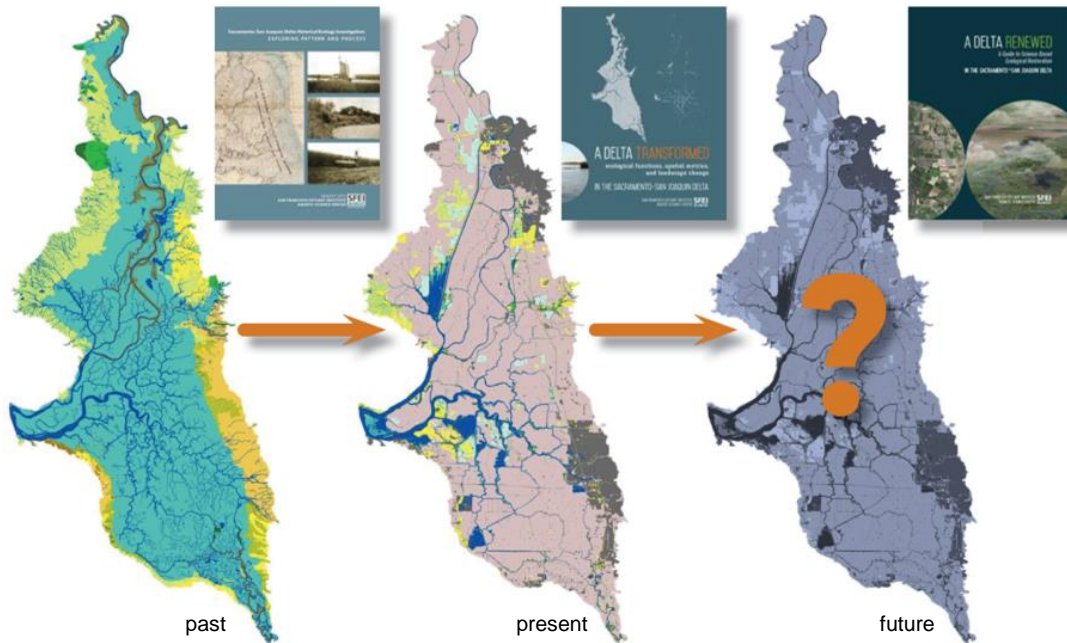
- What functions should be restored?
- What physical and ecological processes are needed to recover these functions?
- How large is large?
- What should be connected to what? And how?
- What is the whole that the parts add up to?
- How does this look different in different parts of the Delta?
- How do we make the system resilient to future stressors including climate change

---

...a landscape vision

# The Delta Landscapes Project

## How Do We Create A Desirable, Healthy Ecosystem in the Future Delta?



Goals and tenets of this approach:

- Help us to think at the landscape-scale
- Emphasize process-based restoration of desired ecosystem functions
- Help us to think holistically
  - Benefit multiple species guilds
  - Benefits to people
  - Watershed connections
- Help us to think large-scale and long-term

# Ecological Functions Provided by the Delta



## Fish

Provides habitat and connectivity for native fish



## Marsh wildlife

Provides habitat and connectivity for native marsh wildlife



## Waterbirds

Provides habitat and connectivity for native waterbirds



## Riparian wildlife

Provides habitat and connectivity for native riparian wildlife



## Edge wildlife

Provides habitat and connectivity for native edge wildlife



## Biodiversity

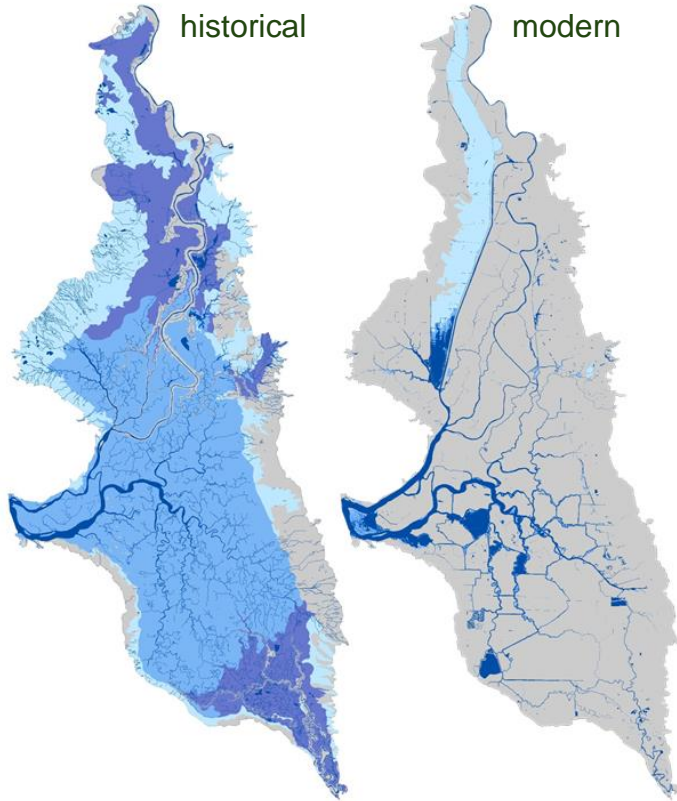
Maintains biodiversity by supporting diverse natural communities



## Productivity

Maintains food supplies and nutrient cycling to support food webs

# • Landscape Metrics: Inundation Extent & Type

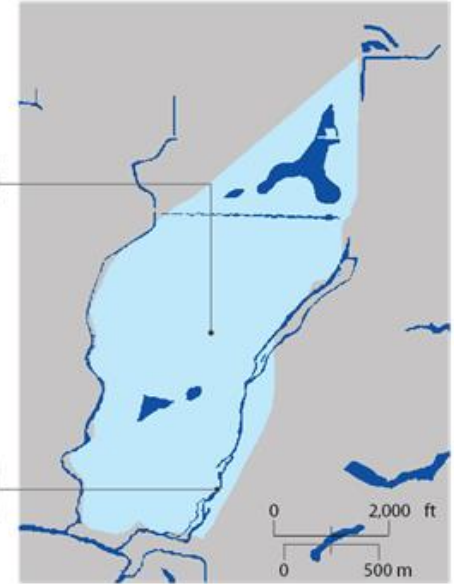
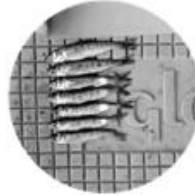


- PONDS, LAKES, CHANNELS, FLOODED ISLANDS
- TIDAL INUNDATION
- SEASONAL LONG DURATION FLOODING
- SEASONAL SHORT-TERM FLOODING

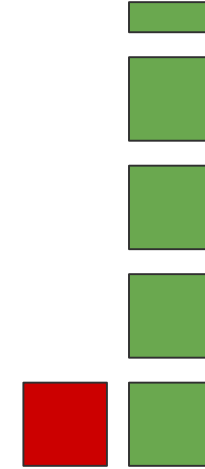
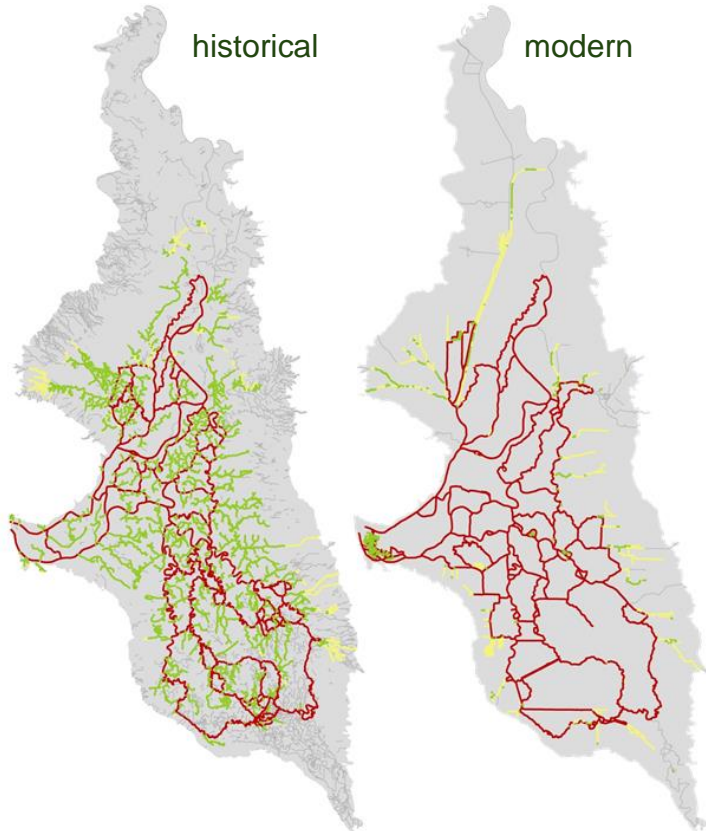
salmon reared on  
Cosumnes River  
floodplain



salmon reared in  
Cosumnes River  
main channel



# • Landscape Metrics: Channel Length & Type



Historical

For every meter of **flow-through channel** there were  
4.25 meters of **blind channels**



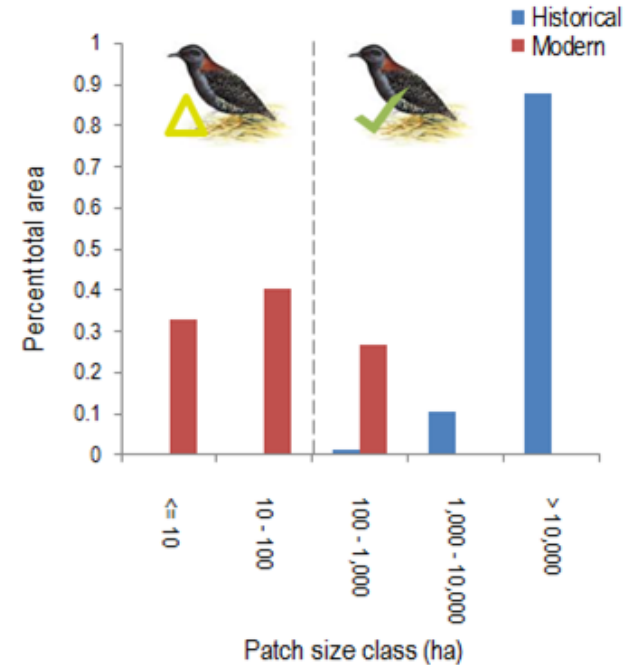
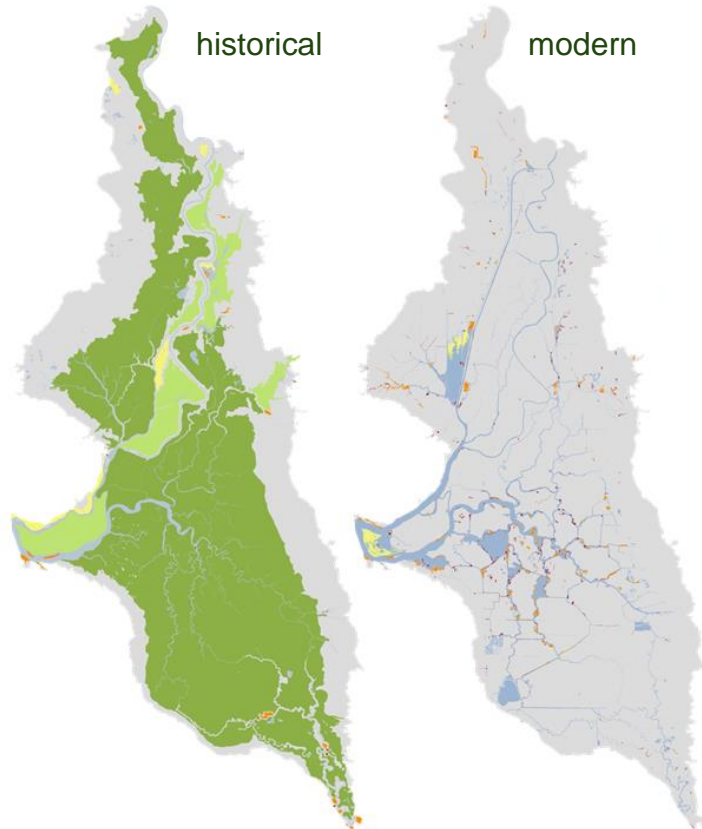
Modern

Blind channels provide:

- Food
- Cover
- Low-velocity refugia
- Access

For every meter of **flow-through channel** there are  
0.44 meters of **blind channel**

# • Landscape Metrics: Marsh Patch Size



# Current Applications

- Delta Plan Ecosystem Amendment (*DSC*)
  - Landscape metrics incorporated as performance measures
- Draft Delta Conservation Framework (*DFW*)
  - Process-based strategies incorporated as objectives
- Regional planning processes (*Delta Conservancy et al.*)
  - Cache Slough Restoration Planning
  - Central Delta Corridor Partnership
  - Northeast Delta Landscape Vision (with TNC)

# Using guiding principles to inform landscape visions

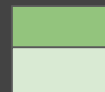
Plan restoration efforts so that marshes are **large** and **connected** enough to provide full range of functions



- Marshes large enough to support dendritic channel networks (>500 ha) at least every ~20 km



- Moderate marshes (>100 ha) at least every ~5 km to support marsh birds and other wildlife



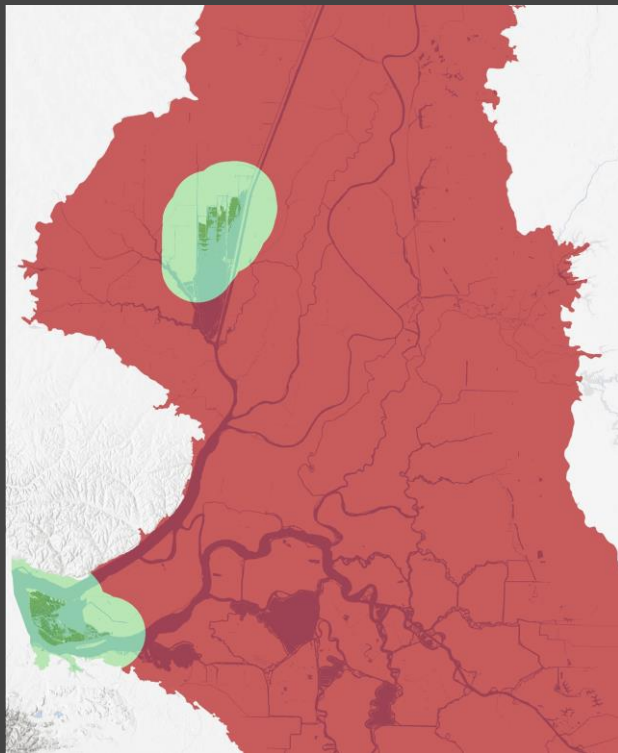
Large marsh patch

Functionally connected area

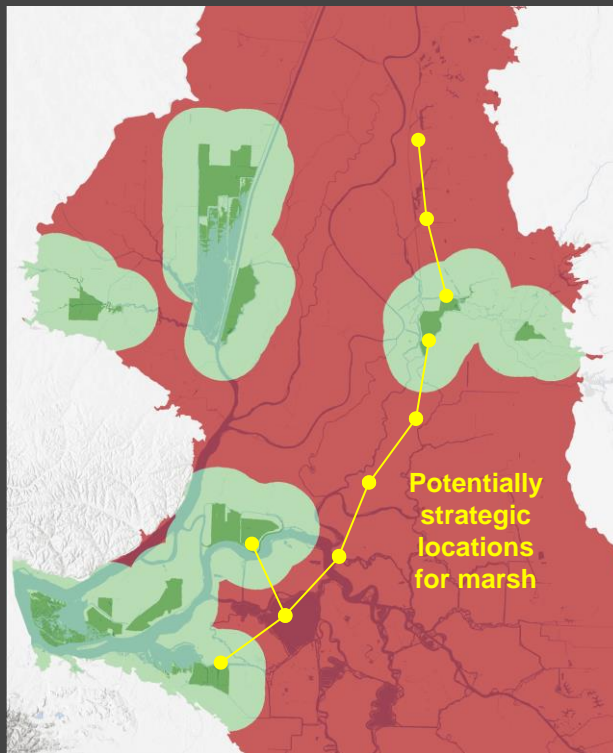


Functionally disconnected area

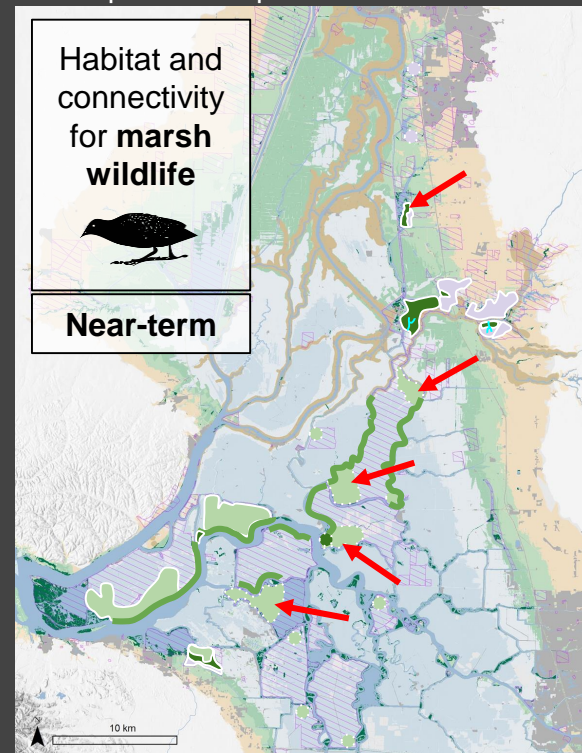
Connectivity: existing



Connectivity: w/ planned EcoRestore projects



Example landscape vision



## Protected areas



Protected areas (CPAD 2017 + CCED 2016)

## Existing land cover



Freshwater marsh



Urban development

## Elevation-based zones



Natural levees



Supratidal zone



Sea-level rise zone



Intertidal zone



Minimally subsided zone



Deeply subsided zone

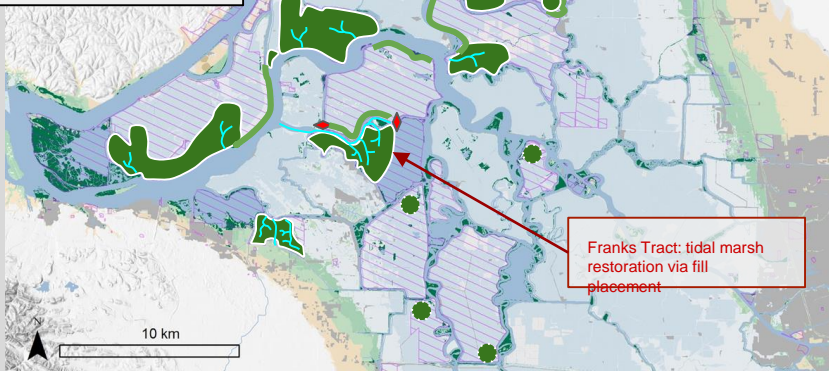
**NOTE:** Draft consultant work product for discussion purposes only. Not endorsed by landowners.

**SFEI**

AQUATIC  
SCIENCE  
CENTER

Also see marsh and riparian wildlife example videos.

**Long-term**



Franks Tract: tidal marsh restoration via fill placement

## Habitat and connectivity for native fish



Restore complex **floodplains and flood basins**



- Expand floodplains along Mokelumne and Cosumnes
- Consider managing Stone Lakes as intermittently flooded basins

Restore **large marshes** at regular intervals along movement corridors



Create **non-tidal managed marshes** in subsided areas



- Short-term foodweb benefits (export of nutrient-rich water)
- Long-term potential habitat benefits (tidal marsh restoration via reverse subsidence)

Restore **marsh habitat along channel edges** via levee modifications and other channel margin enhancements (e.g. planting benches)



Evaluate potential to restore long blind/dendritic channels elsewhere through **reconfiguration of channel cuts**




Restore continuous, hydrologically connected **woody riparian habitats** in appropriate locations







Restore **woody riparian vegetation along channel edges** via levee modifications and other channel margin enhancements (e.g. planting benches)



## Protected areas

 Protected areas

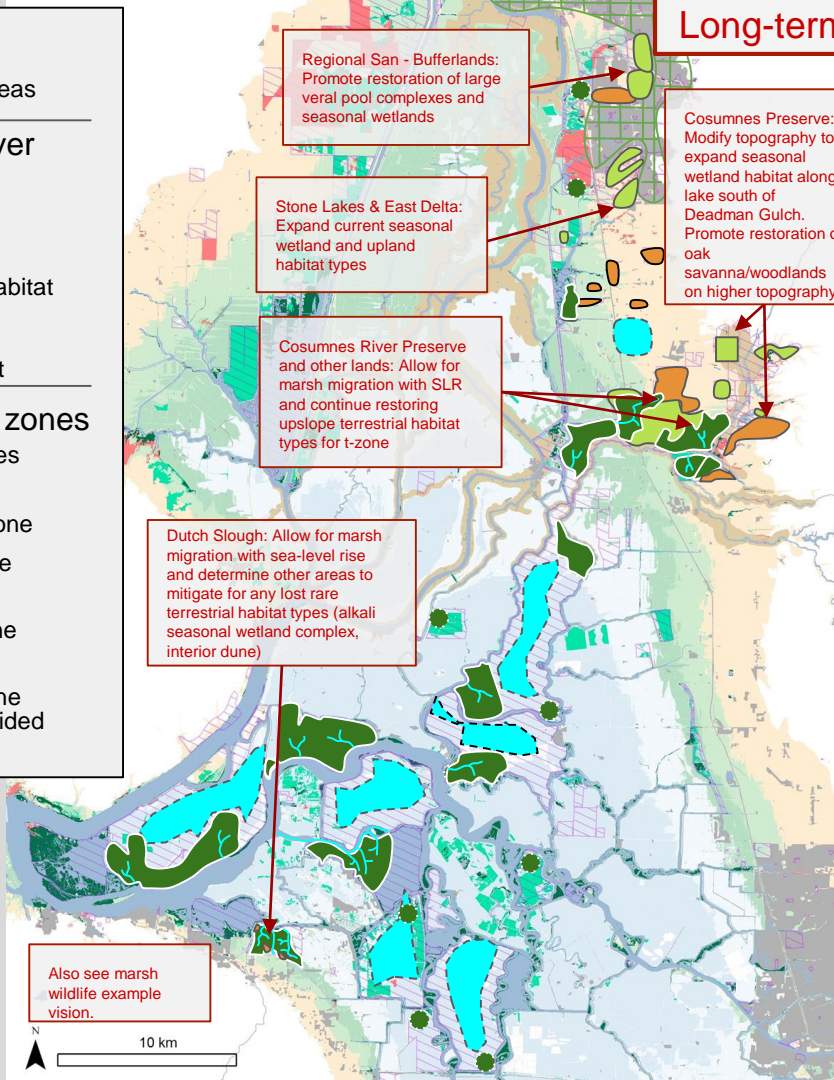
## Existing land cover

 Freshwater marsh  
 Managed wetlands  
 Terrestrial habitat types  
 Urban development

## Elevation-based zones

 Natural levees zone  
 Supratidal zone  
 Sea-level rise zone  
 Intertidal zone  
 Minimally subsided zone  
 Deeply subsided zone



**NOTE:** Draft consultant work product for discussion purposes only. Not endorsed by landowners.





## Long-term

## Habitat and connectivity for edge wildlife



Restore a diverse matrix of appropriate **native terrestrial habitat types** around the Delta's perimeter, including:

-  Seasonal wetland habitat types (e.g., wet meadows, alkali seasonal wetlands, and vernal pool complexes)
-  Upland habitat types (e.g., oak woodlands, stabilized interior dunes, and grasslands)

In areas where the outright restoration of terrestrial habitat types is not feasible, support edge wildlife through **novel approaches**, including:

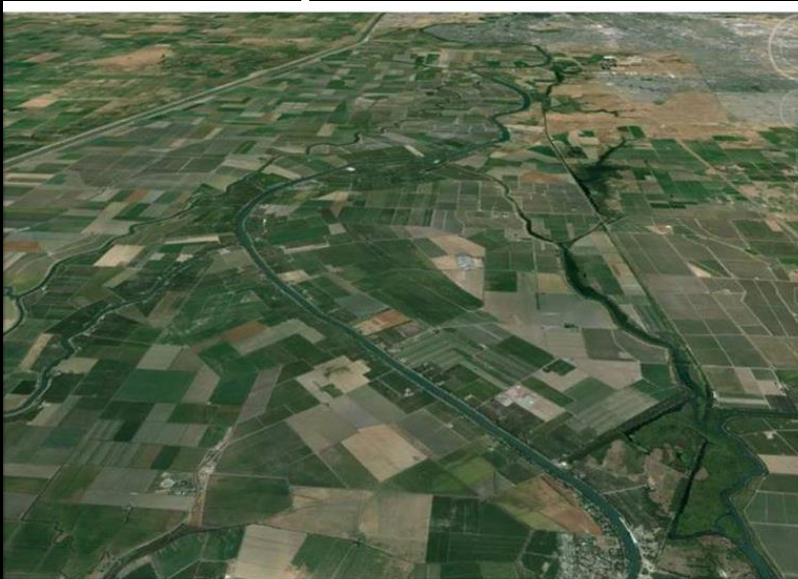
-  Wildlife friendly agriculture
-  Urban greening

Recover **marsh-terrestrial transition zones**:

-  Around the Delta's perimeter, prioritize the restoration of native terrestrial habitat types upslope of marshes
-  In the subsided Delta, support terrestrial habitat types on levees above managed marshes



PAST



PRESENT



FUTURE

# Thank you!

## Funders



DELTA STEWARDSHIP COUNCIL



Extra slides

#### THE DELTA PLAN (2013)

“Management plans and decisions need to be informed by a landscape perspective that recognizes interrelationships among patterns of land and water use, patch size, location and connectivity, and species success.”

#### THE DELTA PLAN (2013)

“In the long term, restoring spatial patterns at ecologically appropriate scales can promote the “self-repair” of ecosystem processes and functions and increase resilience to stressors. Consequently, this approach could reduce the operating and maintenance costs of restoration in an era of limited resources.”

#### MOYLE ET AL. (2012)

“Allowing natural processes to perform as much of the work as possible is an economical and sustainable way to make changes in the Delta.”

#### WATER CODE SECTION 85302 (2009)

“Restore large areas of interconnected habitats within the Delta and its watershed by 2100”

#### THE DELTA PLAN (2013)

“Achieving the coequal goal of ecosystem protection, restoration, and enhancement means successfully establishing a resilient, functioning estuary and surrounding terrestrial landscape capable of supporting viable populations of native resident and migratory species with diverse and biologically appropriate habitats, functional corridors, and ecosystem processes.”

#### THE DELTA PLAN (2013)

“Decisions about land acquisitions for restoration must address how small parcels that become available for restoration might be connected and combined to maximize ecological benefits over the long term”

# External Review

## LANDSCAPE INTERPRETATION TEAM SCIENCE ADVISORS

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Brian Collins (University of Washington)  
Chris Enright (Delta Science Program)  
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